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EXAMINER	
GRAHAM, ANDREW R	
ART UNIT	PAPER NUMBER
2644	

DATE MAILED: 10/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/471,706	SUZUKI, EIICHI	
	Examiner	Art Unit	
	Andrew Graham	2644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 June 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4 and 5* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-2,4-5* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *8/13/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-2 and 4-5 have been considered but are moot in view of the new ground(s) of rejection.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on August 13, 2004 prior to the mailing date of the first action after the filing of a request for continued examination. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement has been considered by the examiner.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. **Claims 1-2 and 4-5** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey

to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In the amendment submitted September 15, 2003, Claim 1 was amended to include the limitation "the voltage controlled amplifier decreases the variable feedback gain as a level of the control voltage increases, thereby adjusting the amplitude-frequency characteristic of the amplifier device, only if the level of the control voltage exceeds a critical level". This limitation remains in the presently considered version of Claim 1. Paraphrased, the limitation states that the "voltage controlled amplifier decreases the gain only if the control voltage exceeds a critical level". This is not supported by the specification. Specifically, the voltage controlled amplifier does not have the capability of determining if one value exceeds a critical value. Also, the comparison is made in regards to the driving voltage, not the control voltage. Rather, the specification states, "Preferably, the adjustment device decreases the variable feedback gain of the feedback device only if the level of the driving voltage exceeds a critical level, and otherwise keeps the variable feedback gain constant as long as the level of the driving voltage remains under the critical level" (page 5, lines 18-23). In other words, the adjustment device, which corresponds to the "providing section" of the currently submitted claims, deals with a critical value, not the feedback device or voltage controlled amplifier, and the critical value is compared to the driving voltage. Appropriate correction is required.

A parallel such limitation appears in Claim 4. Accordingly, Claim 4 is rejected for the same reasons as listed above pertaining to Claim 1. Claims 2 and 5 are rejected for their respective dependencies upon Claims 1 and 4.

Appropriate correction or clarification is required.

4. **Claims 1 and 2** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 1 includes the limitation "a providing section that provides a control voltage having as its sole input a level of the of the driving voltage of the loudspeaker" on lines 5 and 6 of the claim. This limitation restricts other sources of voltages, including reference voltages such as ground, except for the driving voltage from being connected to the "providing section" of the circuit. The only apparent support for this limitation is Figure 1, which illustrates only one input signal line to the signal detector (22) for the section of the circuit that produces a control voltage. The specification positively recites this connection (page 7, lines 19-21), but not in the restricted context that this is the only source of voltage provided to the components of the preferable, presented definition of a "providing section". Claim 1, interpreted in light of the correct scope established by the specification discussed in the

above rejection, requires the determination of the occurrence of the driving level surpassing a critical level. The manner in which this critical level is established or affected in the section, particularly with the only provided voltage being that of the driving voltage is not written in a manner in the required full, clear, concise, and exact terms that would enable any person skilled in the art to which it pertains to make and use the invention and set forth the best mode contemplated by the inventor of carrying out the invention. Appropriate clarification or correction, either of which may involve an amendment to the relevant claim language, is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 1, 2, 4, and 5** are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Dieterich (USPN 4398157).

The disclosure of the present application teaches a loudspeaker driving circuit involving Helmholtz's resonance technique and negative driving technique. Figure 4 is presented as an illustration of this arrangement. The shown driving arrangement (1) includes a

differential amplifier (2) with the signal input (Si) connected to one input terminal and a feedback loop input into the other terminal (page 1, lines 18-21). The input loop comprises a loudspeaker (Sp), a connection through ground to a resistor (Rs), and a feedback amplifier (5) (page 1, lines 21-27). This loop is connected to the positive terminal of the differential amplifier (2), which means that the loop is considered to provide "positive feedback". The disclosure provides a formula that relates the resistances of these components, wherein the effect is to associate a negative value with the output resistance of the differential amplifier, so as to compensate for the resistance of the loudspeaker (Sp) (page 2, lines 15-20). The production of this negative output resistance reads on "for use in a negative impedance drive of a loudspeaker having an internal impedance". The differential amplifier and its output read on "an amplifier device that drives the loudspeaker with a driving voltage". The amplifier (5) included in the feedback loop reads on "a feedback device" that "performs a positive feedback of a signal corresponding to the driving voltage of the loudspeaker to an input of the amplifier device thereby causing the amplifier device to generate a negative impedance effective to negate the internal impedance of the loudspeaker". The arrangement of the output of this amplifier reads on "generating an output signal and positively feeding back that output signal to the input of the amplifier device to thereby perform the positive feedback". The equation provided in the disclosure clearly relates the amplification (A) of the amplifier to the other resistances of the

system, wherein these resistances determine the gain provided for the input signal in the system (page 1, lines 18-21 and page 2, lines 15-19).

However, the applicant's admitted prior art does not specify:

- a providing section that provides a control voltage control voltage having as its sole input a level of the driving voltage of the loudspeaker
- that the feedback device has a variable feedback gain
- that the feedback device comprises a voltage-controlled amplifier having the variable feedback gain and receiving the signal corresponding to the driving voltage,
- that the voltage-controlled amplifier is responsive to the control voltage from the providing section and the signal corresponding to the driving voltage for generating an output signal
- that the voltage-controlled amplifier decreases the variable feedback gain as a level of the control voltage increases, thereby adjusting the amplitude-frequency characteristic of the amplifier device, only if the level of the control voltage exceeds a critical level, and otherwise keeps the variable feedback gain constant as long as the level of the control voltage remains under the critical level

Dietrich discloses a system for controlling the amplitude of a processed signal, wherein the gain adjustments are made through the

control of an amplifier in a feedback loop of the circuit. Figure 2 illustrates an embodiment that reduces or compresses the amplitude of an applied signal. This system also involves the use of an amplifier (100) that receives an input signal (110) on one input terminal and the input of a feedback loop on the other terminal. The loop of this circuit involves the output of the amplifier (100) applied through a variable gain device (14) which Deiterich teaches may be a variable gain amplifier (col. 3, lines 47-68). The operation of this component is controlled by a control signal S3 which is applied to a control terminal of the variable gain device (20) (col. 3, lines 40-57 and col. 4, lines 1-10). The other input to the variable gain device (20) is the output signal of the amplifier (100) (col. 7, lines 25-35). The inclusion of such a component, connected in the described manner, reads on "a feedback device having a variable feedback gain" and "comprising a voltage controlled amplifier having the variable feedback gain and receiving the signal corresponding to the driving voltage". The signal processing effect imposed by the input to the control terminal (18) reads on "the voltage controlled amplifier being responsive to the control voltage from the providing section". The connection of the output of the first amplifier (100) reads on "and the signal corresponding to the driving voltage for generating an output signal". The signal applied to the control input terminal (18) is also derived from the output of the first amplifier (100) through the use of a detector (30) and an adaptive filter (40) (col. 4, lines 1-12 and col. 7, lines 18-24). The detector (30) rectifies the signal

and may be of average, peak, or RMS responding type (col. 4, lines 4-12). The filter (40) comprises a low pass filter, an analog signal gating circuit, and a voltage follower, which collectively adjust the rectified signal from the detector (30) to produce a control signal (col. 4, lines 32-68 and col. 5, lines 1-63). The only input to this part of the system is the output of the amplifier (100) applied through the detector (30). The detector (30) and filter (40) collectively read on "a providing section, that provides a control voltage having as its sole input a level of the driving voltage of the loudspeaker". Dieterich states that the variable gain device may be of the amplifying or attenuating type, and one given example involves an FET that shunts the input signal to ground depending on the control voltage (col. 3, lines 47-68). Dieterich also states that the closed loop gain of the amplifier (100) varies inversely with the input signal level, upon which the input to the feedback amplifier is partially based. Collectively, this inverse relationship and the use of a variable gain amplifier in the processing manner disclosed in the example reads on "the voltage controlled amplifier decreases the variable feedback gain as a level of the control voltage increases". The overall processing of the input signal affects the output range of the processed signal at each frequency, and the detector (30) is particularly noted to desirably include a high pass filter to avoid the effects of low frequency noise (col. 4, lines 13-23 and col. 7, lines 13-18). The expansion, and thereby the respective compression, is also noted as potentially being multiband (col. 4, lines 17-23).

The effect of changing this gain, along with such frequency specific modifications, reads on "adjusting the amplitude-frequency characteristic of the amplifier device". The operation of the filter (40) involves a diode (70) which includes a turn-on voltage (K) (col. 5, lines 48-53). Depending on the input charge, the voltage across the diode (70) is sufficient or insufficient to "turn-on" this diode, which means that one of two charges (V2,V3) is applied to the output terminal (84) of the filter (40). For insufficient voltages, the diode (70) is not conductive, and the output voltage of the filter (40) is equal to the voltage stored on the capacitor (50) (col. 5, lines 40-47 and col. 6, lines 1-16). This state reads on "otherwise keeps the variable feedback gain constant". When the turn-on voltage of the diode is surpassed, the output terminal voltage (84) becomes a voltage that involves the combination of the level of the first amplifier (100) and the turn-on voltage of the diode (70), which reads on "only if the level of the control voltage exceeds a critical level" (col. 5, lines 58-63 and col. 6, lines 30-42). It is further noted that field effect transistors are known in the art to include a threshold voltage, the involvement of which also reads on "otherwise keeps the variable feedback gain constant" and "exceeds a critical level", based on the given amplifier example.

To one of ordinary skill in the art at the time the invention was made, it would have been obvious to incorporate the variable feedback gain means of Dieterich for the feedback amplifier of the applicant's admitted prior art, along with the control means coupled in parallel

as is also taught by Dieterich. The motivation behind such a modification would have been that such variable gain means would have enabled selective restriction of the output level of the processed signal. The applicant's admitted prior art teaches an equation that clearly relates the amplitude of an amplifier in a feedback loop; Dieterich discloses a system for varying this amplitude based on the signal applied across the amplifier, based on a desired, overall output signal level for the overall system.

Regarding **Claim 2**, Dieterich discloses a level detector (30) which receives the initial signal input to the circuitry that provides the control signal (col. 4, lines 4-12). This initial input signal is the same signal applied as input to the variable gain means (14). In view of the positioning of the amplifier in the feedback loop of the system of the applicant's admitted prior art, this detector (30) reads on "a detector that detects the signal corresponding to the driving voltage in terms of a load voltage of the loudspeaker". The filter (40), as cited above, comprises a low pass filter, an analog signal gating circuit, and a voltage follower, which collectively adjust the rectified signal from the detector (30) to produce a control signal at an output terminal (84) (col. 4, lines 32-68 and col. 5, lines 1-63). This filter (40) reads on "a converter that converts the detected load voltage to the control voltage".

Regarding **Claim 4**, please refer above to the rejection of the limitations of Claim 1 for the identically worded limitations of Claim 4. Regarding the different limitations, the signal provided to the

amplifier in the applicant's admitted art is the signal applied across the speaker and in the feedback loop, and the signal detected by the detector (30) of Dieterich is the signal that is applied to the amplifier in the feedback loop. These two teachings collectively read on "corresponding to a level of the driving voltage of the loudspeaker". The system of Dietrich compresses the dynamic range of the processed signal, which involves representing the same degree of input signal amplitude over a smaller effective amplitude range (col. 1, lines 11-12). This compression is based on the limitations or requirements of the path or medium to which the output signal is then applied, and the alteration in amplitude involves each of the frequencies present in the applied input signal (col. 1, lines 13-17). Dieterich also notes the inclusion of frequency specific filters for the amplitude adjustment of individual frequency bands of the input signal (col. 3, lines 25-29 and col. 4, lines 17-23). In the system of the applicant's admitted art, the signal are applied to loudspeakers, which are known in the art to have limits upon the amplitudes of certain frequencies to be emitted. The teachings of the applicant's admitted prior art also teach that the amplitude of the feedback amplifier in the prior art circuit has an associated amplitude characteristic. In view of the effects applied by the compression technique of Dieterich, the results of such amplitude adjustment imposed on the feedback amplifier of the applicant's admitted prior art read on "so as to suppress the amplitude-frequency

characteristic of the amplifier device, thereby preventing an output of the amplifier device from clipping".

Regarding **Claim 5**, please refer above to the rejection of the similar limitations of Claim 2.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Klippel (USPN 5577126) discloses an overload protection circuit for a loudspeaker that includes processing specific to different parts of the signal frequency spectrum.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Graham whose telephone number is 703-308-6729. The examiner can normally be reached on Monday-Friday, 8:30 AM to 5:00 PM (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Isen can be reached on (703)305-4386. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Andrew Graham
Examiner
A.U. 2644

XU MEI
PRIMARY EXAMINER

ag
October 1, 2004